The Real Co$t of E-Waste

What is Electronic Recycling?

Outdated, unwanted and broken electronic equipment are known as e-waste (electronic waste).

E-waste that is not disposed of properly is considered hazardous because it contains metals and other materials that can harm humans and the environment.

Rapid advances in computer technology have resulted in a ballooning volume of outdated and discarded computers.

Did You Know? –

- The average life span of a personal computer in 1992 was 4.5 years. Today, it's 2-3 years.
- Nearly 250 million computers will become obsolete in the next 5 years.
- About 130 million mobile phone are tossed away each year.
- Electronic equipment makes up 1-4% of what goes into landfills.
- An estimated 40 million units of electronic equipment will be recycled in 2007. The majority will be notebook PCs and desktop CPUs.

Source: U.S. EPA. The National Safety Council

The average life span of a Pentium-class computer is 2-3 years. Items that break are usually discarded rather than repaired due to the relatively low price of replacement equipment.

Electronics recycling is complex. Here is the process a typical electronic component may under go at a recycling facility:

Circuit Boards. Most circuit boards and some hard drives can be marketed for resale as operational parts. Unusable circuit boards are chopped into a powder and separated into fiberglass, metals and precious metals.

Plastic Housings. These are difficult to recycle because they contain mixed or unmarked resins that cannot be readily identified or separated, as well as some additives such as flame retardants that complicate recycling. The housings are separated from the electronics and many times they are processed at a smelter to separate the metals from the plastics.

Small Plastic Components. These are removed then ground and processed.

Screws, Clips, Small Metal Parts. Screws, clips, and small metal components are sorted and separated magnetically into ferrous and nonferrous groups. The metals are sold as scrap.

Monitors. The plastic housing, metal supports, and circuit boards are removed. The cathode ray tube (CRT) is crushed and the leaded glass and metal are separated. The glass is screened, processed, and inspected for contaminants. Much of it can be sold to CRT manufacturers for use in new CRT glass. The metal is sold for its scrap value.

Computers being palletized for transport to recycling facility at the 2004 computer recycling event.

Adapted from: WasteWise Update-Electronics Reuse and Recycling. U.S. EPA, Solid Waste and Emergency Response. October 2000. EPA530-N-00-007. Www.epa.gov/wastewise.

Contaminants Found in E-Waste

These otherwise useful materials become contaminants when released into the environment polluting our water, air and food resources. Recycling insures the materials remain bound in useful products.

Cadmium - *Chip resistors, infrared detectors, and semiconductors*. Cadmium is persistent, bioaccumulative, and toxic.

Lead - *Glass panels in monitors and in lead soldering of printed circuit boards.* Lead can accumulate in the environment and have a detrimental effect on plants, animals, humans and water resources. **One computer monitor can contain up to 8 pounds of lead. Consumer electronics may be responsible for 40% of the lead found in landfills.** The principal pathway of concern is lead leaching from landfills and contaminating drinking water supplies.

Mercury - *Sensors, relays, switches and batteries.* When mercury makes its way into waterways, it is transformed into methylated mercury in the sediments. Methylated mercury accumulates in living organisms and travels up the food chain. This is why Montana has fish consumption guidelines: http://www.dphhs.mt.gov/fish.2005.pdf.

Hexavalent Chromium or Chromium VI - *Used to protect against corrosion of untreated and galvanized steel plates.* Major pathways are through landfill leachate or from fly ash generated when materials containing Chromium VI are incinerated.

Brominated Flame Retardants - *Printed circuit boards, components such as plastic covers and cables.* Once released into the environment through landfill leachate and incineration they become concentrated in the food chain. (Source: EPA. The National Safety Council)

Why the Concern with Cell Phones?

Nearly 130 million cell phones are tossed away each year. The circuitry, batteries, and liquid crystal displays in cell phones can contain toxics like arsenic, beryllium, cadmium, copper, and lead. Their plastic casings have also been treated with brominated flame retardants. (Source: EPA)

Cell Phone Disposal Options

Many domestic violence and crisis intervention shelters will accept unwanted cell phones that can then be provided to their clients. Contact a local shelter in your area to see if this option is available to you. Of course, it is a good idea to make sure you remove all the phone book contacts, photos, etc. from your phone prior to donating.

Computer and Electronic Technology Disposal Options

Local -
ReCompute Bozeman, Inc.
411 W. Main Street, Bozeman, MT 59715
(406) 522-9049

Call to arrange drop-off of computers (Pentium II or higher). Will take monitors for a $35 fee. Pick-up possible depending on quantity. Working and non-working accepted. They reuse, re-sell & recycle parts. They accept CPUs, monitors, keyboards, mouse, printers, cartridges.

National -
Many computer manufacturers/retailers (Dell, Gateway, etc.) have recycling programs and will take your old computer system when you purchase a new one. Check out their websites for recycling information and specific details.

GreenDisk — Provides mail-in option for recycling of e-waste. www.greendisk.com

Items Considered to be Consumer Electronics

Televisions and Monitors
Computers
Computer Peripherals
Audio/Stereo Equipment
VCRs
DVD Players
Video Cameras
Telephones
Fax and Copy Machines
Cellular Phones
Wireless Devices
Video Game Consoles

Palletized computers ready for transportation to the recycling facility at the free 2004 Computer Recycling Event for Gallatin County residents.

What is the Real Co$t of E-waste Disposal?

Luckily, more and more consumers are becoming aware of the problems associated with throwing electronic products away. Communities and businesses are providing opportunities for the public to dispose of their e-waste in a responsible manner.

Collecting and facilitating the proper disposal of e-waste is complex, labor intensive and expensive. But doing nothing at all can be more costly to our environment and our health.

E-waste collection events are a great community service. The computer recycling event held for Gallatin County residents in 2004 took in **44.4 tons** of computers and related peripherals—***all at no direct cost to the 500+ residents who participated***. But what are the real costs?

The contracted recycling companies may charge by the pound or a flat rate per item. For example, the recycling fee to properly dispose of a complete desktop computer system (monitor, CPU, keyboard, mouse, speakers) averages $20-$60/system. Costs for disposal by the pound can range from $0.10-$0.60/pound.

Cost of the 2004 Gallatin Co. Computer Recycling Event

Description	Cash Amount	In-Kind Amount	Total Expense
Advertising	$1,652	$ 270	$1,922
Supplies	$ 989	$1,113	$2,102
Volunteer & Staff Time		$10,265	$10,265
Transportation	$4,800		$4,800
Recycling	$8,880		$8,880
TOTAL COST	**$16,321**	**$11,648**	**$27,969**
Real Cost/Event Participant (547)			**$51.13**

Source: Gallatin Local Water Quality District.

Then there are the incidental expenses for holding this type of event: advertising to get the word out, packaging supplies (pallets, shrink wrap, gaylord boxes), equipment use/rental (forklift, pallet jack), disposal of trash, and recycling of cardboard that come with the e-waste when dropped-off. Finally, there is the value of the volunteer and staff time to make the event run successfully.

Many e-waste collection events charge participants a fee, ranging from $5-$15. These are minimal when the total cost of holding a collection event are factored in and the pay-offs to safe-guarding our land and water resources is considered.